HARVARD UNIVERSITY

Meteor Department of Harvard College Observatory

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for

A Theoretical Study of Meteoric Trajectories and Processes, including Examination of the Incidence and Characteristics of Photographic Meteors by Reduction of About 600 Data Points

at

Cambridge, Massachusetts

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PRESENT STATUS

Automatic reduction of Super-Schmidt photographic meteor data is proceeding in a routine manner.

We are continuing the preparation and measuring of glass plate copies of the films, but we have paused in the processing of the data to assess the success of the first 100 cases.

400 meteor pairs have been measured.

PROCEDURE

The preparation procedure is as follows:

1. copy curved film onto a flat glass plate with selective projection centre and density
2. extract date, time, approximate field from camera operation record sheets
3. identify meteor pairs
4. mark on plate 6 bright stars for field identification, and direction of trail
5. measure plate on engine with automatic card punch
6. append record sheet data cards to prepunched measure deck

The 7094 machine program is designed to:

1. select station co-ordinates appropriate to film number, and compute sidereal time
2. sort out star measures from trail measures and take means of repeated measures

3. identify the bright star field and predict approximate trail star positions

4. compute, for a pair, relative station co-ordinates, and write, on auxiliary tape, data required for trail reduction

5. write, on a second auxiliary tape, data necessary to compute plate constants for each plate

6. when all pairs have been processed to this point, search faint star map once for all trail stars

7. select appropriate trail stars for each plate in turn, and:
   1) compute plate constants
   2) fit curves to field correction
   3) apply field correction to trail
   4) transform co-ordinates so that the trail becomes the X axis, as in standard meteor reduction
   5) plot, in printed output, field correction curves, uncorrected and corrected trails
   6) write out new auxiliary quantities for later reduction

The evaluation must decide:

1. Were there any failures to proceed to this point?

2. Do the plate constants solutions indeed look reasonable?

3. Does application of the field correction improve the appearance of the trail?

4. Are there scattered trail measures which unrealistically affect the determination of the trail equation?

To continue machine program:

1. For each plate for which data was transcribed onto the auxiliary tapes, a new input card must answer the above questions, so that, for those pairs which are satisfactory in all respects, the program will

2. proceed with the standard reduction program.

Analysis:

1. A careful appraisal is always made at this point, of the inner consistency of the result, of the reliability of the velocity and deceleration determination, and of any atypical behaviour.

2. Orbits and masses may then be computed.

PROBLEMS

There remain two points at which human error can be introduced: The record data are not always accurately transcribed onto the identifying cards of each package; a new input must be entered to proceed beyond the drawing of the straight line to represent the trail.

The very bulk of paper produced for perusal is in itself a hazard to orderly process.

A new format has been introduced for the automatic punching of the measures, so that a listing can be more easily scanned for obvious vagaries of the measuring-engine readout system.

There is no significant stumbling-block.

IN PROGRESS

There are 100 cases at hand for which we can judge the success of the star identification over a large random sample, and from which we can determine the appropriate comment quantities to feed in for selection of the "best" trail equation.